UNITED STATES DEPARTMENT OF AGRICULTURE
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PROMISING NEW ANTIBIOTIC EMERGES FROM USDA CHEMICAL LABORATORIES

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Chemists of the U. S. Department of Agriculture think they have the answer to a question that has puzzled plant pathologists for the last 25 years - just what gives some tomato plants immunity to a wilt disease that kills others? Wilt-resistant tomato plants, the chemists found, manufacture a chemical compound that halts invading wilt organisms much as penicillin, manufactured by a mold, stops the advance of certain disease organisms in the human body. This new antibiotic, called "tomatine," can now be prepared in pure form in quantities large enough to permit a detailed study of its structure and the way the plant makes, uses, and finally disposes of it. The results of such studies are expected to pave the way for an entirely new approach to the development of disease-resistant plants - an important phase of the Department's research.

Today's wilt-resistant tomatoes are the result of a plant-breeding project started a quarter of a century ago, when the disease threatened to wipe out the tomato growing industry in the Southeast. A world-wide search for a tomato plant having high natural immunity to wilt produced just one - the "Red Currant" tomato growing wild in South America. Because of its very small fruit, this variety could not be introduced as a replacement for the varieties being grown in North America. By crossing this wild wilt-resistant variety with cultivated wilt-susceptible varieties, however, the plant breeders succeeded in developing a wilt-resistant variety bearing fruit of good commercial quality. Now the material that makes tomato plants resistant to the wilt organism has been extracted and purified.

Laboratory tests show that tomatine is antagonistic to a number of disease organisms other than the fungi responsible for tomato wilt, including some that cause human ailments. Whether or not it will become a valuable therapeutic agent, however, depends on the outcome of tests now under way in the Duke University School of Medicine. Bacteriologists and clinicians there are studying the toxicology and therapeutic value of tomatine supplied by the Department of Agriculture. If their investigation proves it to be a safe and effective drug for human use, the medical profession will gain its first agent for controlling minor fungus infections, such as athletes foot, and perhaps more serious internal fungus infections.

But even if tomatine turns out to have little or no place in medicine, its discovery and isolation mark a definite forward step in the development of disease-resistant tomatoes, cabbage, peppers, potatoes, sweetpotatoes, and other crop plants.

The accompanying pictures show some of the steps in the isolation of tomatine, as conducted by Dr. Thomas D. Fontaine, in charge of the research, and two of his assistants - Dr. Roberta M. Ma, a biochemist, and Mrs. Janet B. Poole, a bacteriologist.

(OVER)

Picture Story No. 54 - TOMATINE - AN ANTIBIOTIC FROM THE TOMATO PLANT

(EDITORS AND WRITERS: You may obtain 8x10 glossy prints of any of the pictures here shown free on request to Press Service, Office of Information, U. S. Department of Agriculture, Washington 25, D.C.)

(1) Immunity to wilt disease in tomato plants ranges from none in a commercial variety (left), through some in two hybrids, to a high degree in a wild species from South America.

(2) Wilt-resistant tomato plants are dried to provide material for research on tomatine.

Tomatine is recovered in the laboratory by

(3) Pouring dried tomato plant material into warm dilute hydrochloric acid solution

(4) Adding ammonium hydroxide to the clarified crude tomatine extract

(5) Concentrating the alcohol solution of crude tomatine

(6) To give tomatine in pure crystalline form

(7) Which has a feathery appearance under the microscope

The antibiotic power of tomatine is determined by assays with various bacteria and fungus spores

(8) Stock cultures of which are used

(9) Pure tomatine is pipetted into a cylinder in a petri dish inoculated with a test organism

(10) At the end of the incubation period definite zones of inhibition to the growth of the disease organisms appear around the two cylinders containing the pure tomatine extract, as compared with none around the two cylinders containing penicillin and a heavy growth around the one containing crude tomato plant extract.